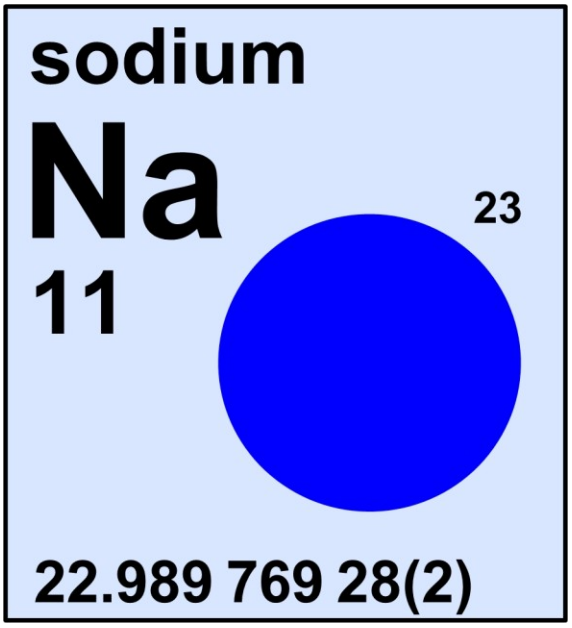
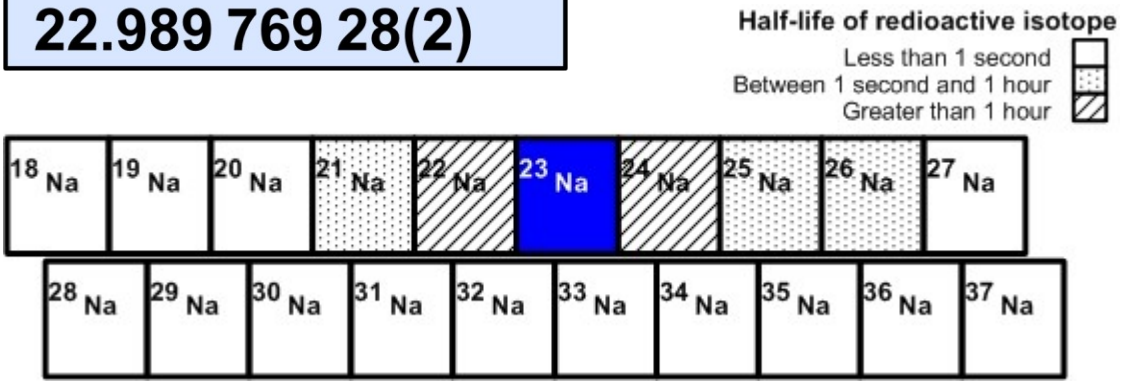
sodium



Stable isotope	Atomic mass*	Mole fraction
^{23}Na	22.989 769 28	1.0000

* Atomic mass given in unified atomic mass units, u.



Important applications of stable and/or radioactive isotopes

Isotopes in medicine

1) ^{22}Na is a radionuclide for PET imaging with a very long half-life (2.6 years) for a positron emitting radionuclide.

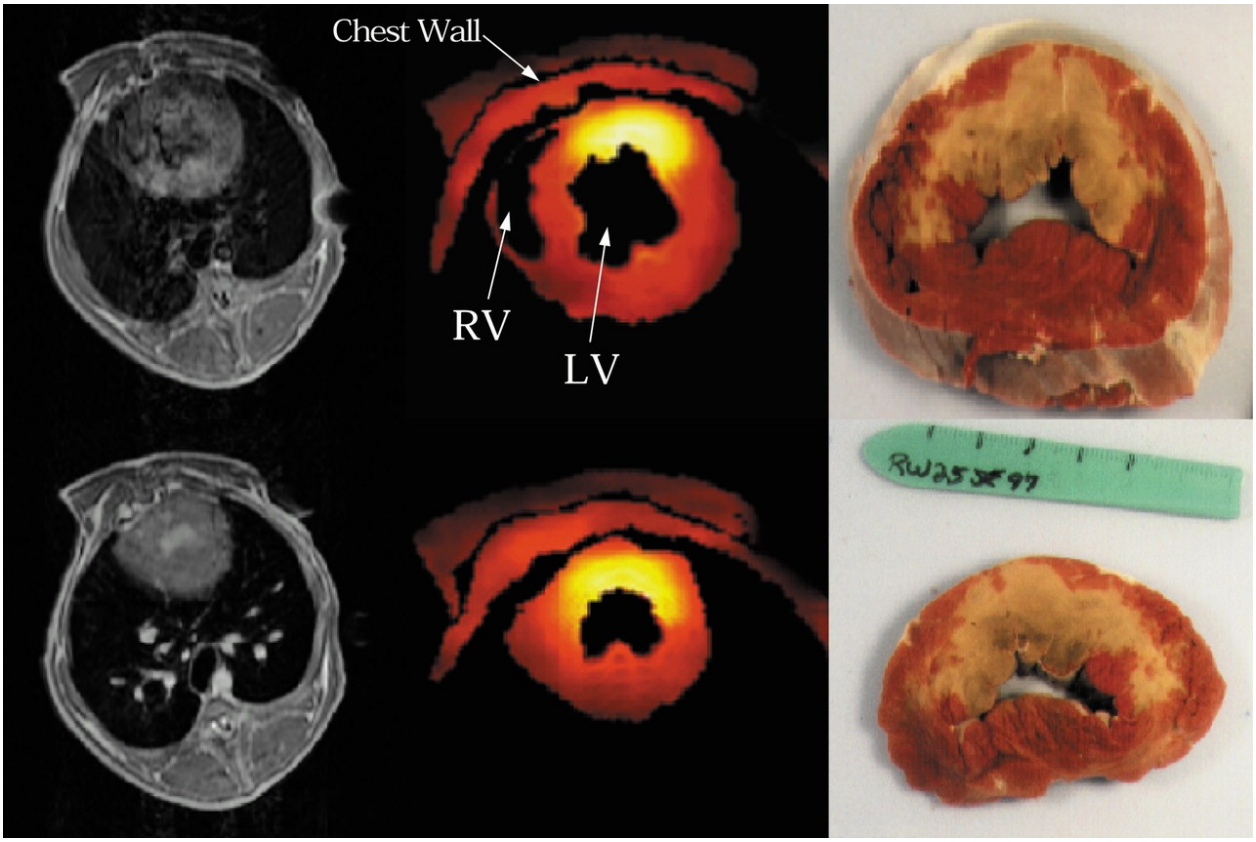


Figure 1: Sodium exists in high concentrations outside cells (≈140 mmol/L) and in lower concentrations inside. ^{23}Na magnetic resonance (MR) images (middle column) of a canine heart after occlusion (closure of a blood vessel) of the left anterior descending coronary artery. An increase in signal from the ^{23}Na is apparent on the anterior wall (yellow color), which correlates with the tissue death seen in the triphenyl tetrazolium chloride (TTC)-stained sections (right column). TTC stains healthy cells a pink/red color and lysed/dead cells white. Proton scout images (left column) are shown for comparison. The proton images, Na-23 images, and photographs of TTC-stained sections are not to scale. LV = left ventricle, RV = right ventricle.

Isotopes in tracer studies

1) Both ^{22}Na (half life: 2.6 years) and ^{24}Na (half life: 15 h) can be used as tracers to study electrolytes in the human body.

Isotopes in hydrology

1) ^{22}Na is a cosmogenic isotope of suitable half-life to study residence time of water in freshwater basins and dating of young surface and underground waters.